

PATENT ABSTRACTS OF JAPAN

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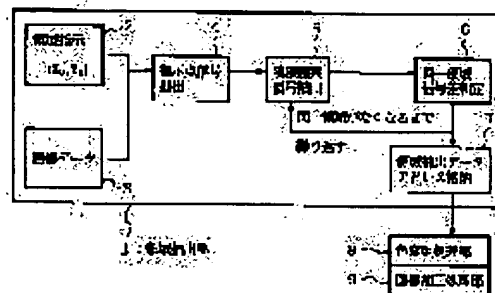
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(54) AREA EXTRACTION SYSTEM

(57)Abstract:

PURPOSE: To accurately and automatically extract a desired area through easy operation by deciding on the same area corresponding to the indication of an aimed pixel when the signal value and spatial color distance of an adjacent pixel are less than specific value as to the area extraction system which extracts the area from an image.

CONSTITUTION: This system is equipped with an adjacent pixel signal extraction part 5 which extracts pixel signals of pixels adjoining to the aimed point indicated in the image in order and an identical area signal difference decision part 6 which decides the same area when the difference or color distance between the pixel signals extracted in order by the adjacent pixel signal extraction part 5 and the pixel signal of the aimed point is less than a specific value, and is so constituted as to output the same area decided by the identical area signal difference decision part 6.



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CLAIMS

[Claim(s)]

[Claim 1] The contiguity pixel signal extract which carries out the sequential extract of the pixel signal of the pixel which adjoins the observing point of having been directed on the image, in the field sampling procedure which extracts a field out of an image (5), It has the same field signal difference judging (6) judged to be the same field when the difference or color distance of the pixel signal and the pixel signal of an observing point in which the sequential extract was carried out by this contiguity pixel signal extract (5) is less than a predetermined threshold. The field sampling procedure characterized by constituting so that the same field judged by this same field signal difference judging (6) may be outputted.

[Claim 2] The field sampling procedure according to claim 1 characterized by constituting so that each of these may judge with the same field in quest of the difference of each element (for example, lightness, a hue, saturation) of a pixel signal at the time less than of a predetermined threshold as a difference of the pixel signal and the pixel signal of an observing point by which the sequential extract was carried out [above-mentioned].

[Claim 3] The field sampling procedure according to claim 1 characterized by constituting so that it may judge with the same field in quest of a spatial color distance (color distance which carried out the multiplication of the predetermined multiplier to each element) as a color distance of the pixel signal and the pixel signal of an observing point by which the sequential extract was carried out [above-mentioned], when the color distance is less than a predetermined threshold.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention is a field sampling procedure which extracts a field out of an image, and in case it processes images, such as color photography, in the field of printing, a newspaper, and a design, it relates to the field sampling procedure which extracts a desired field.

[0002] In recent years, development of the system treating the color picture using a computer is furthered with the demand of colorization of printed matter. A color picture processing system inputs color photography etc. from a camera or an image scanner, and outputs it to an output device. Outputting an input manuscript as it is has little printed matter at this time, and a certain color correction and image processing are performed in many cases. For example, a color may be changed, or when creating a poster etc., it may be used combining two or more images, so that it is bright in the color of a face if it is a portrait image, and it may become vivid about a lip. In case color modification and image processing of these fields are performed, the operator is wanted to direct an image field and to extract a field automatically by easy actuation.

[0003]

[Description of the Prior Art] Conventionally, as an approach of directing an image field in an image processing system (a mask, extract), as shown in (a) of drawing 7, there is the manual approach of tracing the boundary line which wants to process using a mouse or a digitizer. This read one point [one] which the mouse passed, made the image location the boundary line, and was extracting the field.

[0004] Moreover, as shown in (b) of drawing 7, near the boundary of a field is directed with a rectangle etc. and there is the semi-automatic approach of searching the inside of the field automatically. This investigated the brightness (brightness) of the image data in the directed rectangle, considered that the part from which the value changes rapidly was a boundary, and was extracting the field. Drawing 7 is explained briefly below.

[0005] (a) of drawing 7 shows the explanatory view which extracts a field by the manual approach. The boundary line of a graphic form was traced like illustration with the mouse (or digitizer) here, and the closed region surrounded by this boundary line was extracted.

[0006] (b) of drawing 7 shows the explanatory view which extracts a field by the semi-automatic approach. Here, when the image to extract like illustration with a mouse etc. was directed with the rectangle, the brightness of the image data in this rectangle was investigated automatically, and the field was extracted by making into a boundary line the part from which that value changes rapidly. and -- compounding with the image of others [**** / changing a color] about the these-extracted field **** -- etc. -- it was processing.

[0007]

[Problem(s) to be Solved by the Invention] Since it worked while the operator looked at the image when a boundary line was directed with a mouse and a field was extracted, as shown in the manual approach of (a) of drawing 7 which the former mentioned above, field directions were exact, but when it was going to direct the complicated image and the big image, very much time amount was needed and there was a problem of being inefficient-like.

[0008] Moreover, as shown in the semi-automatic approach of (b) of drawing 7 which the former mentioned above, when limiting the field range with a rectangle etc. and extracting a field automatically based on brightness in this field, as compared with the manual approach, directions become easy. However, since a boundary is distinguished only by brightness information and the field is extracted, the field where only the hue is changing is made into the same field, or even if it is a same color phase, the field where only brightness differs is made into another field, and there is a problem that a desired field cannot be extracted. For this reason, the correction by the operator was needed and there was also a problem of being inconvenient.

[0009] In order that this invention may solve these problems, corresponding to directions of an attention pixel, when the signal value and a spatial color distance of a contiguity pixel are less than a predetermined value, it is judged to be the same field, and aims at carrying out automatic extracting of the desired field correctly by easy actuation.

[0010]

[Means for Solving the Problem] With reference to drawing 1, The means for solving a technical problem is explained. In drawing 1, the contiguity pixel signal extract 5 carries out the sequential extract of the pixel signal of the pixel which adjoins the observing point of having been directed on the image.

[0011] The same field signal difference judging 6 judges with the same field, when the difference or color distance of the pixel signal and the pixel signal of an observing point in which the sequential extract was carried out by the contiguity pixel signal extract 5 is less than a predetermined threshold.

[0012]

[Function] This invention judges to be the same field, when the difference or the color distance of the pixel signal and the pixel signal of an observing point with which the sequential extract of the pixel signal of a pixel with which the contiguity pixel signal extract 5 adjoins the observing point of having been directed on the image carried out, and the sequential extract of the same field signal difference judging 6 was carried out by contiguity pixel signal extract 5 is less than a predetermined threshold, as shown in drawing 1, and he is trying to output this same field that judged.

[0013] Under the present circumstances, he is trying for each of these to judge with the same field in quest of the difference of each element (for example, lightness, a hue, saturation) of a pixel signal at the time less than of a predetermined threshold as a difference of the pixel signal and the pixel signal of an observing point by which the sequential extract was carried out.

[0014] Moreover, when the color distance is less than a predetermined threshold, he is trying to judge with the same field in quest of a spatial color distance (color distance which carried out the multiplication of the predetermined multiplier to each element) as a color distance of the pixel signal and the pixel signal of an observing point by which the sequential extract was carried out.

[0015] Therefore, corresponding to directions of an attention pixel, when the difference and color distance with a signal value of a contiguity pixel are less than a predetermined threshold, it becomes possible by judging with the same field to carry out automatic extracting of the desired field correctly by easy actuation.

[0016]

[Example] Next, the configuration and actuation of the example of this invention are explained to a detail one by one using drawing 6 from drawing 1.

[0017] Drawing 1 shows 1 example block diagram of this invention. In drawing 1, the difference or color distance with a pixel signal of the pixel by which the field extract section 1 adjoins the pixel signal of the attention pixel directed on the image extracts the field of the pixel within a predetermined threshold (mask), and it consists of the field directions 2, image data 3, the directing point signal extract 4, contiguity pixel signal extract 5, the same field signal difference judging 6, field extract data-address storing 7, etc.

[0018] The field directions 2 are in the condition which displayed image data 3 on the screen, and are the directions clicked with the mouse in the field which it is going to extract, for example, are the coordinates (X0, Y0) clicked and directed with the mouse.

[0019] Image data 3 is image data which is going to display on a screen and is going to extract a field, for example, is image data, such as RGB (red, green, blue), HVC (a hue, lightness, saturation), Lab (lightness, color), or YMC (yellow, a Magenta, cyanogen).

[0020] The directing point signal extract 4 extracts the pixel signal of the point (observing point) directed by the field directions 2 from image data 3. The contiguity pixel signal extract 5 extracts the pixel signal of the pixel which adjoins the observing point of having been directed on the image.

[0021] The same field signal difference judging 6 judges with the same field, when the difference or color distance of the pixel signal of an observing point and the pixel signal extracted by the contiguity pixel signal extract 5 is less than a predetermined threshold.

[0022] The field extract data-address storing 7 stores the address of the pixel judged by the same field signal difference judging 6 to be the same field. The pixel of the address stored in this field extract data-address storing 7 serves as the extracted same field.

[0023] The color modification processing section 8 changes a color about the field extracted by the field extract section 1. For example, wear the face of the person who extracted bright, a lip is made vivid, or a color is changed.

[0024] The image processing processing section 9 processes an image about the field extracted by the field extract section 1. For example, when creating a poster etc., image processing which doubles two or more sets of extracted

fields is performed.

[0025] Next, actuation of the configuration of drawing 1 is explained to a detail according to the sequence shown in the flow chart of drawing 2. In drawing 2, as for S1, an operator directs the point of an extract field. On the screen of drawing 3, this clicks 1 directions in a field of illustration of the part of an apple with a mouse, and performs them an extract field and here.

[0026] S2 performs ejection of the HVC value of the coordinate point (X0 and Y0) of an attention pixel. This takes out the HVC value of the coordinate point (X0 and Y0) of the attention pixel of the observing point directed by S1 from image data 3.

[0027] The contiguity pixel of an attention pixel judges S3 in the same field. This compares with the HVC value of a contiguity pixel the HVC value of the attention pixel taken out by S2, and judges whether it can be regarded as the same field within a predetermined difference and within predetermined color distance.

[0028] S4 distinguishes whether the same field is in the contiguity pixel of an attention pixel. This distinguishes whether the color difference or color distance of an attention pixel and a contiguity pixel can regard it as the same field within a predetermined value by S3. The coordinate it was considered by S5 in YES that was the same field is stored in address storing (field extract data-address storing 7). And it carries out by repeating S3. On the other hand, in NO, it ends by S4 (END).

[0029] When the difference or the color distance of a contiguity pixel which adjoins the coordinate (X0, Y0) of this directed observing point by the above corresponding to having directed one in the field which an operator is going to extract is less than a predetermined value, it becomes possible to extract automatically the same field including the observing point of having repeated and directed regarding it as the same field and storing in the field extract data-address storing 7.

[0030] Drawing 3 shows the explanatory view of this invention of operation. This takes out the coordinate point (X0 and Y0) of the directed attention pixel, as an operator expands and shows right-hand side on the image displayed on the screen corresponding to having directed one point in the field of an apple here. And the HVC value of the adjoining pixel is taken out, and as compared with the HVC value of an attention pixel, when the color difference or color distance is less than predetermined, it repeats regarding it as the same field. here, a contiguity pixel adjoins an attention pixel, as shown in right-hand side -- there are eight pieces. When it is considered that a contiguity pixel is the same field, it repeats similarly about the pixel which adjoins a contiguity pixel further. By repeating this actuation, the same field judges all the pixels within predetermined, and the HVC value, the color difference, or color distance of an attention pixel becomes possible [extracting the same field].

[0031] Drawing 4 shows the example block diagram of this invention. This is an example block diagram when expressing with a HVC value (a hue, lightness, saturation) as image data. In drawing 4, the directions coordinate value 12 is a coordinate value (X0, Y0) of the point (observing point) which the operator directed with the mouse etc. on the screen.

[0032] Image data 13 is the HVC value of each pixel here. The picture signal retrieval 15 takes out the HVC value of the observing point (X0, Y0) directed with the directions coordinate value 12, and a contiguity pixel, and notifies it to the signal difference judging 16.

[0033] As for the signal difference judging 16, the color difference or color distance distinguishes the HVC value of an attention pixel, and the HVC value of a contiguity pixel in within the limits of the judgment threshold data 18 (it explains in full detail using drawing 5).

[0034] The field extract data-address storing 17 stores the address of the pixel in the same field judged by the signal difference judging 16 to be within the limits of the judgment threshold data 18 (it explains in full detail using drawing 6).

[0035] The judgment threshold data 18 are data for comparing the HVC value of an attention pixel with the HVC value of a contiguity pixel, and judging with the inside of the same field, and are a modification possible value by the operator.

[0036] Next, actuation of the configuration of drawing 4 is explained to a detail according to the sequence shown in the flow chart of drawing 5. In drawing 5, as for S11, an operator directs the point extracting [field]. This clicks and directs on a screen the point which an operator wants to extract as the same field with a mouse (X0, Y0).

[0037] S12 takes out the HVC value of the coordinate as follows by making the directed coordinate point (X0, Y0) into an attention pixel (refer to (a) of drawing 6).

- H0=H (X0, Y0)
- V0=V (X0, Y0)
- C0=C (X0, Y0)

An attention pixel and its about eight contiguity pixel judge S13 in the same field (refer to (b) of drawing 6).

[0038] - Contiguity pixel : $-H_{ij}=H(X_0+i, Y_0+j)$

- $V_{ij}=V(X_0+i, Y_0+j)$

- $C_{ij}=C(X_0+i, Y_0+j)$

- judgment type: $-|H_{ij}-H_0| < eh$, $|V_{ij}-V_0| < ev$, and $|C_{ij}-C_0| < ec$ -- here -- i and j - it is 1, 0, and +1 and remove $i=j=0$.

[0039] These search for the difference of the HVC value of eight adjoining contiguity pixels, and the HVC value of an attention pixel, respectively, and when the whole value is smaller than a predetermined value (eh, ev, ec), they judge with the same field.

[0040] S14 distinguishes whether it was regarded as the same field. Since it was regarded as the same field in YES, the coordinate value it was considered by S15 that was the same field is stored in address storing (field extract data-address storing 17) (refer to (b) of drawing 6), and it progresses to S16. On the other hand, in NO, it progresses S16.

[0041] S16 takes out the same field pixel from address storing as an attention pixel (X_0, Y_0). S17 distinguishes whether there is any attention pixel. the case of YES -- a contiguity pixel -- since there were some which are made into an inner attention pixel, S13 or subsequent ones are repeated and it performs it. On the other hand, in NO, since S13 or subsequent ones were altogether repeated as an attention pixel about the contiguity pixel, it ends (END).

[0042] The difference of the HVC value of the attention pixel of the observing point directed by the above corresponding to the operator having directed the point extracting [field] on the screen and the HVC value of a contiguity pixel repeats regarding it as the same field at the time less than of a predetermined value, and becomes possible [extracting automatically the same field (referring to (d) of drawing 6) including an observing point].

[0043] The color distance of the bottom on a color space is in addition, wholly good [the above-mentioned judgment type] in the same field, when respectively smaller about H (hue), V (lightness), and C (saturation) than a predetermined threshold also as below a predetermined value as follows as a judgment of the color continuity during two contiguity.

[0044] $\alpha(H_i-H)^2 + \beta(V_i-V)^2 + \gamma(C_i-C) < eh_{vc}$ -- here, alpha, beta, and gamma are the constants defined beforehand. Drawing 6 shows the example explanatory view of this invention.

[0045] (a) of drawing 6 shows signs that the address of the contiguity pixel in the same field is stored in the address storing 17. Here, the HVC value (H_0, V_0, C_0) and the HVC value of about (X_0+i, Y_0+j) eight contiguity pixel (H_{ij}, V_{ij}, C_{ij}) of the attention pixel of a directing point (X_0, Y_0) are compared, and the thing of the same field as the attention pixel within a predetermined value is stored in the address storing 17. Here, $i=j=0$ is removed.

[0046] (b) of drawing 6 stores the address of the pixel of the same field as an attention pixel in the field extract data-address storing 17. (c) of drawing 6 makes an attention pixel the contiguity pixel stored in the field extract data-address storing 17 of drawing 6 of (b), and it judges whether it is the same field about the about eight contiguity pixel, and when regarded as the same field, signs that the address is stored are shown in the field extract data-address storing 17. By this, the same field will spread towards the outside one by one from the attention pixel.

[0047] When (d) of drawing 6 makes an attention pixel the contiguity pixel which repeats (c) of drawing 6 and is stored in the field extract data-address storing 17, it repeats storing the address of the pixel of the same field in the field extract data-address storing 17 and it ends about all, signs that the extract field for which it asks is obtained like illustration are shown. He makes a central directing point into the first attention pixel, and is trying to ask for the illustration extract field which is a repeat same field one by one here.

[0048]

[Effect of the Invention] The sequential extract of the pixel signal of the pixel which adjoins the observing point of having been directed on the image according to this invention as explained above carries out, and when the difference or the color distance of the extracted pixel signal and the pixel signal of an observing point is less than a predetermined threshold, it repeats judging with the same field, and since the configuration which extracts the same field has been adopted, the automatic extracting of the same field can carry out correctly by easy actuation. These (1) The pixel which adjoins from a directing point is taken out one by one, for example, a HVC value is investigated, and less than a predetermined value, the color difference can repeat that color distance extracts the same field below a predetermined value, and can extract the same exact field.

[0049] (2) **** which progresses color modification and processing of an image efficiently since the same field can be automatically extracted only by directing one point of the field which an operator wants to extract especially -- things are made.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is 1 example block diagram of this invention.

[Drawing 2] It is the explanation flow chart of this invention of operation.

[Drawing 3] It is the explanatory view of this invention of operation.

[Drawing 4] It is the example block diagram of this invention.

[Drawing 5] It is the field extract flow chart of this invention.

[Drawing 6] It is the example explanatory view of this invention.

[Drawing 7] It is the explanatory view of the conventional technique.

[Description of Notations]

1: Field extract section

2: Field directions

3 13: Image data

4: Directing point signal extract

5: Contiguity pixel signal extract

6: The same field signal difference judging

7 17: Field extract data-address storing

8: Color modification processing section

9: Image processing processing section

12: Directions coordinate value

15: Picture signal retrieval

16: Signal difference judging

18: Judgment threshold data

[Translation done.]

* NOTICES *

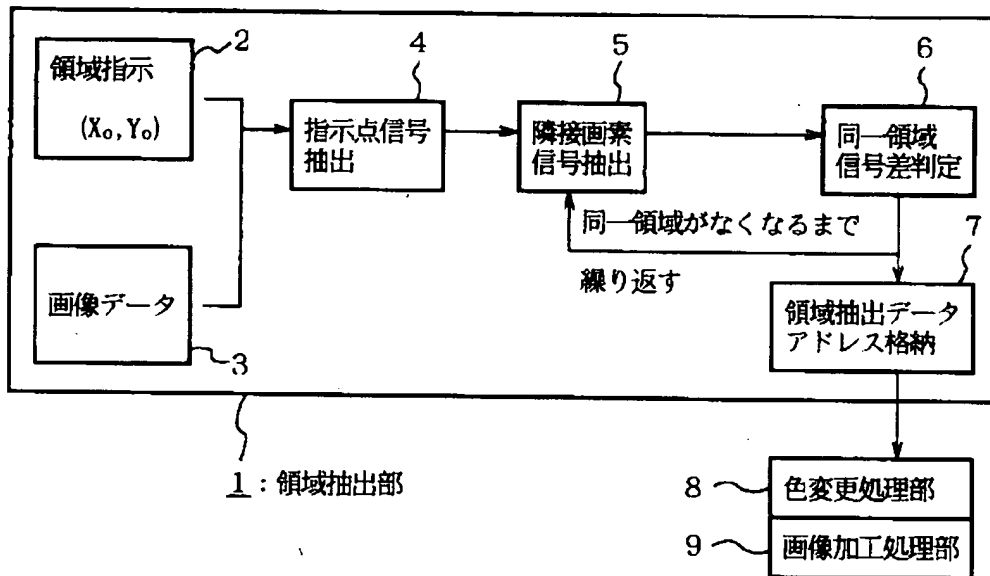
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DRAWINGS

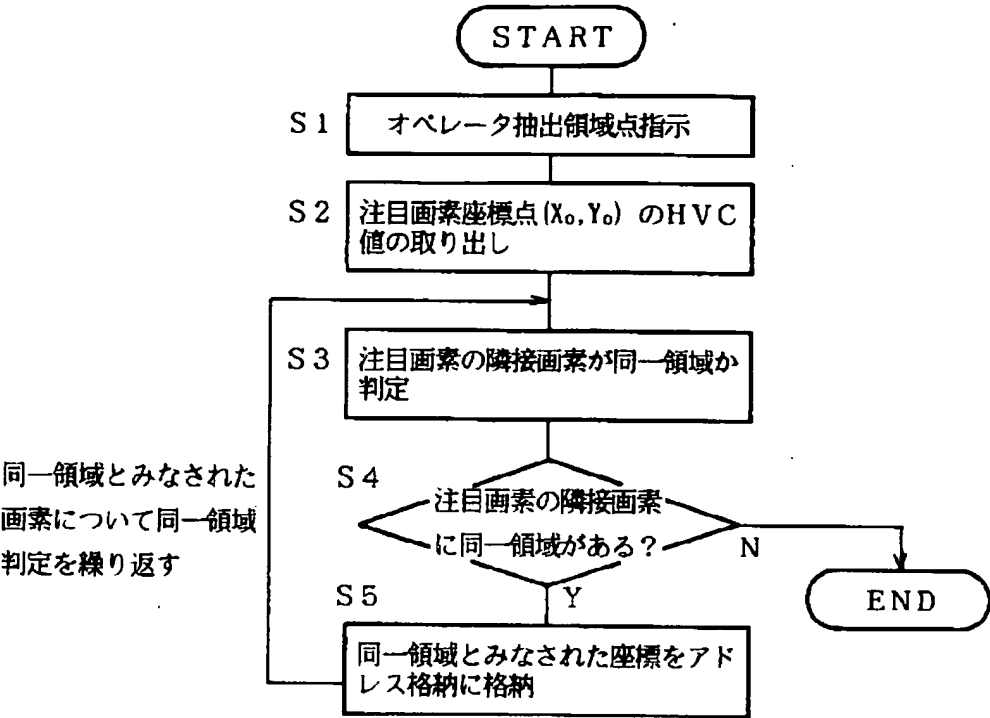
[Drawing 1]

本発明の1実施例構成図

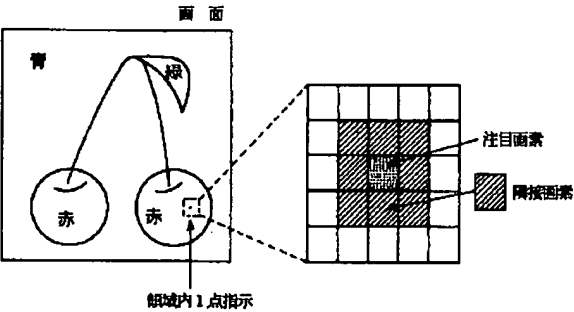


[Drawing 2]

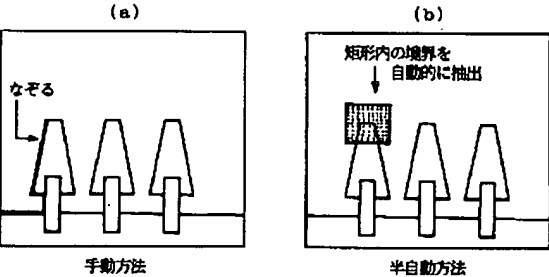
本発明の動作説明フローチャート



[Drawing 3] 本発明の動作説明図

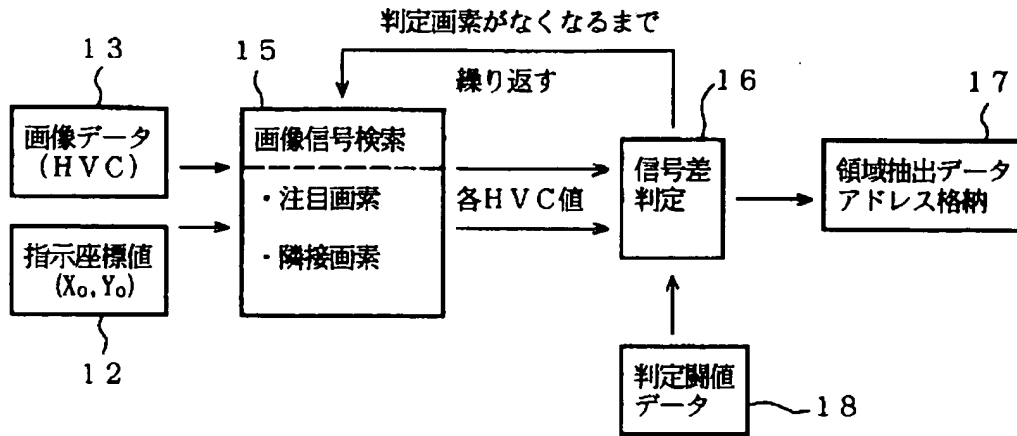


[Drawing 7] 従来技術の説明図



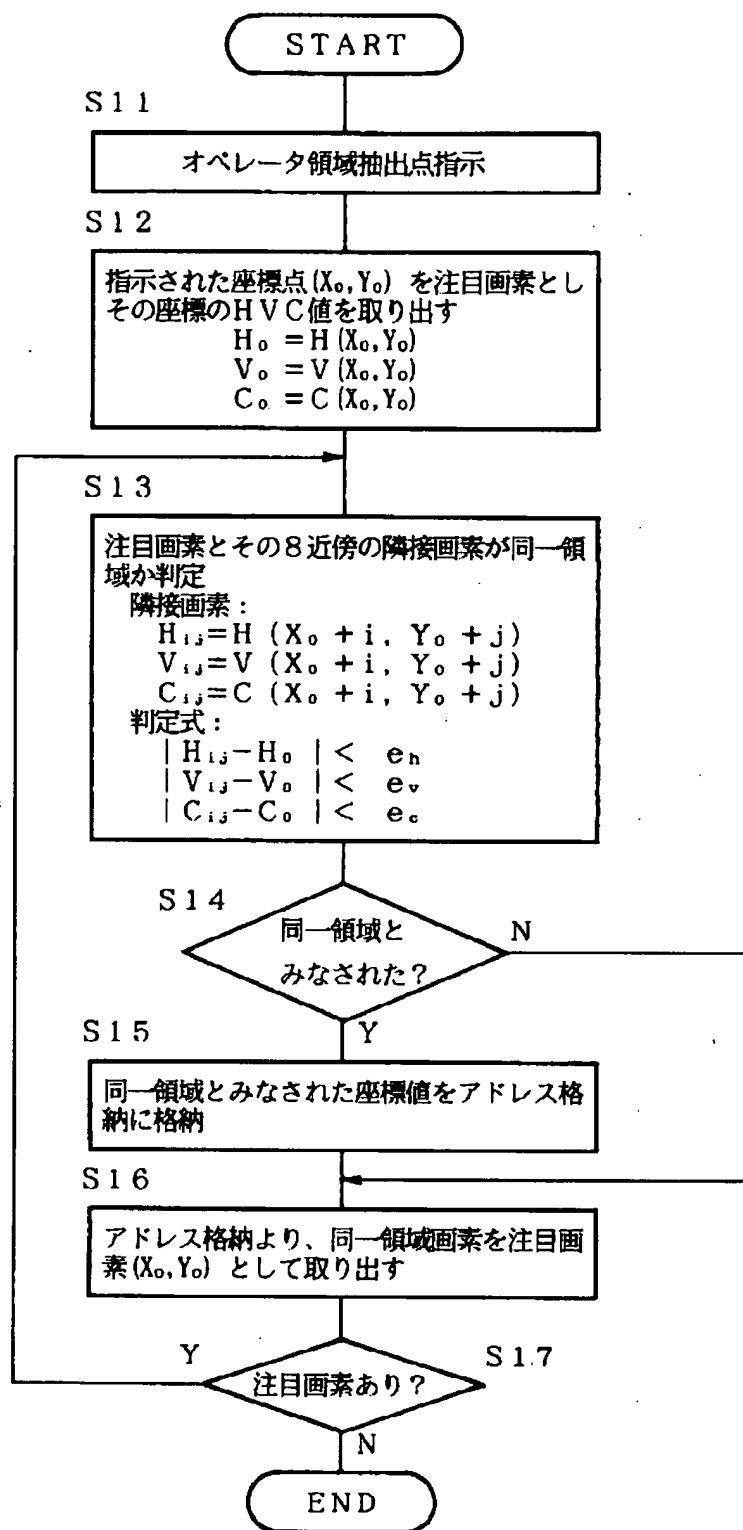
[Drawing 4]

本発明の具体例構成図



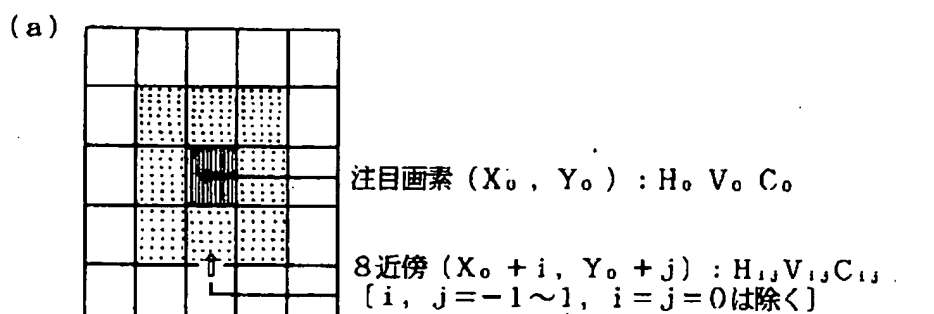
[Drawing 5]

本発明の領域抽出フローチャート



[Drawing 6]

本発明の具体例説明図

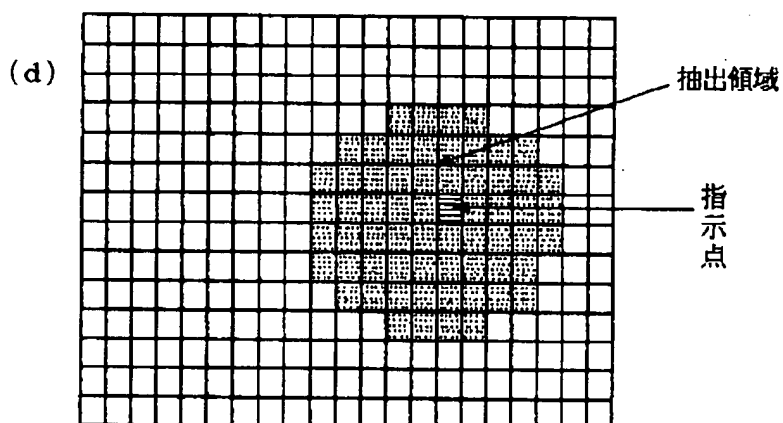
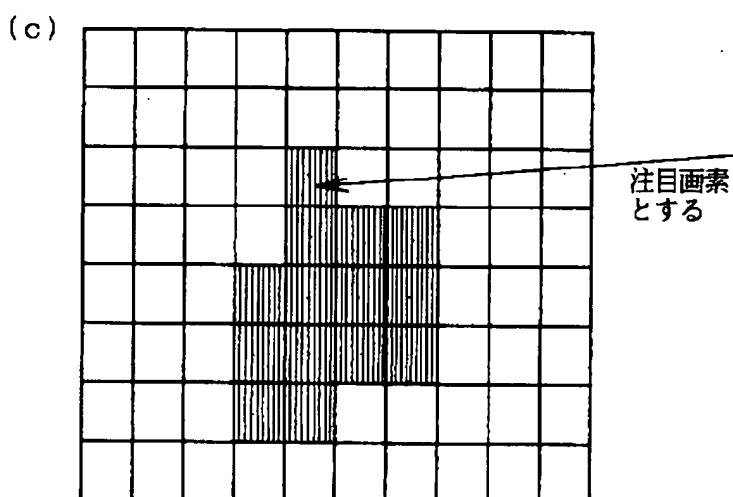


Yes

注目画素と同一領域?

(b) $\frac{17}{\{$

アドレス格納部
(X_0, Y_0)
(X_1, Y_1)
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(X_k, Y_k)
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